PATENT APPLICATION

of

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for

ADJUSTOR FOR JUVENILE VEHICLE SEAT

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ADJUSTOR FOR JUVENILE VEHICLE SEAT

BACKGROUND

The present disclosure relates to juvenile vehicle seats and particularly to juvenile vehicle seats having a seat shell and a headrest movable up and down relative to the seat shell. Specifically, the present disclosure relates to a height-adjustment mechanism for raising and lowering the headrest.

Many juvenile vehicle seats are formed to include a headrest which adjusts upwardly and downwardly relative to a bottom seat portion of the juvenile seat. Such a juvenile seat can be adapted by a user to seat children of different sizes.

SUMMARY

According to the present disclosure, a juvenile seat includes a seat shell having a bottom seat portion and a back support portion coupled to the bottom seat portion and positioned at an angle relative to the bottom seat portion. A headrest of the juvenile seat is coupled to the seat shell and is arranged for up and down movement relative to the seat shell to adjust a height of the headrest above the bottom seat portion of the seat shell.

The juvenile seat further includes a height-adjustment mechanism including a locking pin coupled to the headrest and a vertical slot provided in the back support portion of the seat shell. The locking pin is coupled to the headrest for up and down movement with the headrest. The locking pin is also received through the vertical slot of the height-adjustment mechanism. The vertical slot defines vertically-spaced position indicators formed to receive the locking pin in a locked position to prevent the headrest from moving upwardly and downwardly relative to the seat shell.

The locking pin includes a first portion having a first diameter and a second portion coupled to the first portion and having a second diameter larger than the first diameter. The second portion of the locking pin is positioned within one of the position indicators in the locked position and is disengaged from the position

indicators in an unlocked position to permit the headrest to move upwardly and downwardly relative to the seat shell.

The headrest and locking pin are arranged to move in a direction generally perpendicular to a plane formed through the back support portion when moving between the locked and unlocked positions. Further, the rear surface of the headrest is engaged with the back support portion in the locked position and is spaced-apart from the back support portion in the unlocked position.

Features of the present disclosure will become apparent to those skilled in the art upon consideration of the following detailed description of illustrative embodiments exemplifying the best mode of carrying out the disclosure as presently perceived.

BRIEF DESCRIPTION OF THE DRAWINGS

The detailed description particularly refers to the accompanying figures in which:

Fig. 1 is a front perspective view of a juvenile vehicle seat including a seat shell, a child-restraint harness, and a headrest movable up and down relative to the seat shell, and further showing the headrest located in a lowest position above a bottom seat portion of the seat shell;

Fig. 2 is a front perspective view of the seat of Fig. 1 showing the headrest having been moved relative to the seat shell to a highest position above the bottom seat portion of the seat shell;

Fig. 3 is a rear perspective, exploded view of the seat of Figs. 1 and 2 showing a height-adjustment mechanism for raising and lowering the headrest above the bottom seat portion of the seat, the height-adjustment mechanism having two actuators each including an engagement bracket coupled to the headrest and having two spaced-apart pins or posts, a spring to be positioned over one of the posts, and a shroud to enclose the engagement bracket and spring, and further showing vertical slots of the height-adjustment mechanism provided in the seat shell and formed to receive the posts of the engagement bracket therethrough;

Fig. 4 is an exploded, perspective view with portions broken away of one of the actuators of the height-adjustment mechanism showing a first, constant

diameter post or guide pin of the engagement bracket and a second, variable diameter post or locking pin of the engagement bracket, each of which are received through the respective vertical slot provided in the seat shell, and further showing the shroud and spring of the actuator to be coupled to the engagement bracket;

Fig. 5 is a sectional view of one of the actuators taken along line 5-5 of Fig. 1 showing the actuator in a locked position to prevent up and down movement of the headrest and showing a larger diameter portion of the locking pin received within a position aperture or indicator of the vertical slot;

Fig. 6 is a sectional view similar to Fig. 5 showing a user having pulled the headrest away from a back support portion of the seat shell to move the actuator to an unlocked position where the larger diameter portion of the locking pin is disengaged from the position indicator of the vertical slot to permit up and down movement of the headrest relative to the seat shell;

Fig. 7 is a sectional view similar to Figs. 5 and 6 showing the actuator in the unlocked position and showing the user having moved the headrest (with the actuator) upwardly from the lowest position (shown in Fig. 5) toward a highest position (shown in Fig. 8) in order to adjust a height of the headrest above the bottom seat portion of the seat shell;

Fig. 8 is a sectional view similar to Figs. 5-7 showing the user having released the headrest (after moving the headrest upwardly) to allow the spring of the actuator to bias the headrest to the locked position;

Fig. 9 is a sectional view similar to Figs. 5-8 showing an alternative, rear-actuated method of moving the actuator to the unlocked position by pushing on a rear surface of the engagement bracket against the bias of the spring to release the larger diameter portion of the locking pin from within the position indicator of the vertical slot; and

Fig. 10 is a sectional view similar to Fig. 9 showing the user moving the headrest upwardly toward the highest position above the bottom seat portion of the seat shell.

DETAILED DESCRIPTION

A juvenile vehicle seat 10 is provided to support juveniles. Juvenile seat 10 may be coupled to a seat (not shown) within a vehicle (not shown) for example, to secure the juvenile within the vehicle. Although reference is made to a juvenile vehicle seat 10, it is within the scope of this disclosure to include juvenile booster seats or other such seats for supporting and securing juveniles within a vehicle or other structure.

Juvenile seat 10 includes a height-adjustment mechanism 12 (see Fig. 3) for adjusting the height of a headrest 14 of the seat 10 up and down relative to a bottom seat portion 16 of a seat shell 18 of the seat 10. Headrest 14 may be moved from a lowered or lowest position shown in Fig. 1 to a raised or highest position shown in Fig. 2 by operating height-adjustment mechanism 12 as shown in Figs. 5-10 to release a locking post or pin 20 coupled to headrest 14 from within a position indicator 22 provided in a back support portion 24 of seat shell 18. A user may adjust a height of headrest 14 from the front of seat 10, as shown in Figs. 5-8, and may also adjust a height of headrest 14 from the rear of seat 10, as shown in Figs. 9 and 10. In other words, seat 10 provides a user with front- and rear-actuated methods of adjusting the height of headrest 14 above bottom seat portion 16. Further, as shown in Fig. 5, a small offset distance 100 is provided between mating portions of the headrest 14 and back support portion 24. This small offset distance provides a smooth and continuous backrest surface for the juvenile seated within seat 10.

As shown in Fig. 1, juvenile vehicle seat 10 includes seat shell 18, headrest 14 coupled to seat shell 18, and a child-restraint harness 26 also coupled to seat shell 18 to restrain a juvenile within seat shell 18. Seat shell 18 includes bottom seat portion 16 adapted to support a juvenile's bottom and upper legs thereon, back support portion 24 coupled to bottom seat portion 16 and positioned to lie at an angle relative thereto, and a pair of side walls 28, 30 each coupled to back support portion 24 and bottom seat portion 16, as shown in Figs. 1 and 2. Side walls 28, 30 are provided for preventing lateral movement of the juvenile seated in seat 10 and are located on opposite sides of both bottom seat portion 16 and back support portion 24. A notch 32 is formed in each side wall 28, 30 for receiving a portion of a seat belt (not

shown) of the vehicle (not shown) to position a portion of the seat belt over a juvenile's lap, for example, when the juvenile is seated on bottom seat portion 16.

Seat 10 also includes a cloth or covering 34 to cover seat shell 18 and cloth or covering 35 to cover headrest 14. Seat 10 further includes a pair of shoulder belt guides 36, 38 each coupled to an upper portion of a respective side wall 28, 30 of seat shell 18. Each illustrative guide 36, 38 includes two substantially "T-shaped" slots 40 formed to receive a shoulder belt portion (not shown) of a vehicle seat belt system properly to position and thread the shoulder belt portion of the seat belt system over seat 10. Although illustrative guides 36, 38 each provide two slots 40 or positions for the vehicle shoulder belt, it is within the scope of this disclosure to provide shoulder belt guides 36, 38 formed to include additional slots.

Headrest 14 of seat 10 includes a back plate 42 and first and second wing members 44, 46 coupled to opposite edges of back plate 42 and positioned to lie in spaced-apart relation to one another. Each wing member 44, 46 is oriented to lie at an angle relative to back plate 42, as shown in Figs. 1 and 2, for example. A rear surface 43 of back plate 42 lies adjacent to and engages a front, planar surface or a back support surface 48 of back support portion 24, as shown in Figs. 5 and 8. Similarly, wing members 44, 46 lie adjacent to and may engage respective side walls 28, 30 of seat shell 18. As is discussed in greater detail below, apertures 50 are formed through back plate 42 of headrest 14 for receiving fasteners 52 therethrough to couple headrest 14 to a portion of height-adjustment mechanism 12 which moves upwardly and downwardly with headrest 14 relative to seat shell 18.

As mentioned above, a small offset distance 100 is provided between mating or adjacent portions of headrest 14 and back support portion 24. This small offset distance 100 provides a smooth and continuous backrest surface for the juvenile. Illustratively, offset distance 100 is measured between back support surface 48 of back support portion 24 and a planar front surface 102 of back plate 42 of headrest 14. Illustratively, offset distance 100 meets the FSMV213 requirements for the year 2004 which require the offset distance for the backrest surface of all juvenile vehicle seats to be less than 3/8 (0.375) inch (9.53 mm).

The up and down movement of headrest 14 relative to seat shell 18 functions to raise and lower headrest 14 above bottom seat portion 16 to adapt seat 10

to accommodate small-and large-sized juveniles. Thus, headrest 14 moves up and down relative to seat shell 18 to assure proper fit for a juvenile seated in seat 10. A caregiver can raise and lower headrest 14 to change the height of headrest 14 by operating height-adjustment mechanism 12. As is discussed in greater detail below, the height of headrest 14 above bottom seat portion 16 may be adjusted by a caregiver from either a position facing the front of the seat 10, as shown in Figs. 5-8, or from a position facing the rear of seat 10, as shown in Figs. 9 and 10. Thus, height-adjustment mechanism 12 can be actuated from the front and from the rear to allow the user to adjust the height of headrest 14 from the front or rear of the seat 10.

Height-adjustment mechanism 12 includes two actuators 54, 56 coupled to headrest 14. Each actuator 54, 56 is coupled to back plate 42 of headrest 14, and is positioned adjacent a rear side 58 of back support portion 24. Illustratively, therefore, a back support surface 60 of back support portion 24 is positioned between headrest 14 and the actuators 54, 56. The positioning of the actuators 54, 56 on the rear side 58 of the back support portion 24 allows a user to actuate and move the height-adjustment mechanism 12 to an unlocked position to allow a user to move the headrest 14 up and down relative to the seat shell 18 from the rear side 58 of the seat 10. Further, as is discussed in greater detail below, a user may also actuate and move the height-adjustment mechanism 12 to the unlocked position from a front side 62 of the seat 10. The positioning of actuators 54, 56 on the rear side 58 of back support portion 24 contributes to providing small offset distance 100 discussed above and shown in Fig. 5. As is discussed in greater detail below, actuators 54, 56 operate to bias headrest 14 to a locked position to prevent up and down movement of headrest 14 relative to the seat shell 18.

As shown in Figs. 3 and 4, height-adjustment mechanism includes a pair of vertical slots 64, 66 of the height-adjustment mechanism 12 provided in the back support portion 24 of seat shell 18. Specifically, vertical slots 64, 66 are provided in respective flange members 68, 70 of back support portion 24. Seat shell 18 further includes support ribs 72, 74 coupled to a rear surface 60 of back support portion 24 such that flange 68 with vertical slot 64 is adjacent support rib 72 and flange 70 with vertical slot 66 is adjacent support rib 74. As shown best in Fig. 3, vertical slots 64, 66 are spaced-apart from each other such that child-restraint harness

26 is positioned therebetween. Although illustrative seat 10 includes two vertical slots 64, 66 provided in back support portion 24 and positioned in spaced-apart relation to each other, it is within the scope of this disclosure to provide a seat 10 having any number of vertical slots which are positioned at other suitable locations on seat 10. Further, it is within the scope of this disclosure to provide vertical slots 64, 66 on portions of seat 10 other than back support portion 24.

As shown best in Figs. 3 and 4, each vertical slot 64, 66 defines three position apertures or position indicators 22 formed therein. A lowest position indicator 76 corresponds to a lowest position of headrest 14 above bottom seat portion 16, as shown in Fig. 1, for example. A middle position indicator 78 similarly corresponds to a middle position of headrest 14 while a highest position indicator 80 corresponds to a highest position of headrest 14, as shown in Fig. 2, for example. Illustratively, each vertical slot 64, 66 includes the three position indicators 76, 78, 80 mentioned above; however, it is within the scope of this disclosure for each vertical slot 64, 66 to define any suitable number of position indicators to represent any number of positions of headrest 14 above bottom seat portion 16.

Each vertical slot 64, 66 therefore, defines position indicators 76, 78, 80 which are each spaced-apart from each other and vertical segments 82, 84, 86 which are also each spaced-apart from each other. Illustratively, each position indicator 76, 78, 80 is adjacent at least one vertical segment 82, 84, 86 and each vertical segment 82, 84, 86 is adjacent at least one of the position indicators 76, 78, 80 such that vertical segments 82, 84, 86 are alternatingly spaced with position indicators 76, 78, 80. As shown in Figs. 3 and 4, position indicators 76, 78, 80 are substantially circular in shape and are defined by bulging edges 88, 90 of each respective vertical slot 64, 66. Each position indicator 76, 78, 80, therefore, is wider than the vertical segments 82, 84, 86 of each vertical slot 64, 66. As is discussed in greater detail below, a portion of each actuator 54, 56 is received within vertical slots 64, 66.

The actuators 54, 56 are identical to each other; therefore, reference is made only to the left actuator 56 shown in Figs. 5-10. Actuator 56 includes an engagement bracket 92 coupled to the headrest 14, a shroud 94 surrounding the engagement bracket 92, and a spring 96 coupled to the engagement bracket 92 and

engaged with the engagement bracket 92 at one end and with a portion of the shroud 94 at another end.

Engagement bracket 92 of each actuator 54, 56 includes a base member 110, a first post or guide pin 112 coupled to base member 110, and second post or locking pin 20 coupled to base member 110, spaced-apart from first post 112, and positioned generally parallel to first post 112. Illustrative base member 110 is oval in shape and includes a front surface 114 and a rear surface 116; however, it is within the scope of this disclosure for base member to be any suitable shape. Guide pin 112 is cylindrical in shape to define a substantially constant or unchanging diameter along a length of guide pin 112, as shown in Fig. 4. A first end 118 of guide pin 112 is coupled to front surface 114 of base 110. A threaded bore 120 is formed in a second end 122 of guide pin 112.

Second post or locking pin 20 similarly includes a first end 124 coupled to front surface 114 of base 110 and a second end 126 having a threaded bore 128 formed therein. Locking pin 20 is a variable diameter post or pin such that locking pin 20 includes a first portion 130 coupled to base 110 and having a first diameter 132 (shown in Fig. 5) and a second portion 134 coupled to the first portion 130 and having a second diameter 136 (shown in Fig. 5) larger than the first diameter 134. Illustratively, a diameter 138 of the guide pin 112 is 0.400 inch (1.02 mm), the diameter 132 of the first portion 130 of the locking pin 20 is 0.400 inch (1.02 mm), and the diameter 136 of the second portion 134 of the second post or locking pin 20 is 0.820 inch (2.08 mm).

As mentioned above, each pin 20, 112 is formed to include a threaded bore 128, 120 respectively. Threaded bores 128, 120 each receive a fastener, such as illustrative screw 52, therein in order to couple headrest 14 to each actuator 54, 56. Thus, illustrative screws 52 are received through apertures 50 formed in back plate 42 of headrest 14 and are received within threaded bores 128, 120 of each respective post 20, 112 to attach each engagement bracket 92 to headrest 14. Thus, each engagement bracket 92 is movable up and down with headrest 14 as the height of headrest 14 is adjusted above bottom seat portion 16. As shown in Figs. 5-10, pins 20, 112 extend through vertical slots 64, 66 provided in back support portion 24 in order to couple with headrest 14. Further illustratively, pins 20, 112 are coupled rigidly to headrest

14 such that pins 20, 112 and headrest 114 are immovable relative to each other. In other words, both pins 20, 112 and headrest 14 move upwardly and downwardly together relative to seat shell 18 and, as is discussed in greater detail below, pins 20, 112 and headrest 14 also move back and forth horizontally together relative to seat shell 18.

Spring 96 of each actuator 54, 56 is received about the locking pin 20 of engagement bracket 92 of each respective actuator 54, 56. A first end 140 of spring 96 engages front surface 114 of base 110 and a second end 142 of spring 96 engages an inner surface 144 of shroud 94 to urge respective locking pin 20 to a locked position within a position indicator 22 to prevent headrest 14 from being moved upwardly or downwardly relative to seat shell 18. As is discussed in greater detail below, locking pin 20, spring 96, base 110, and vertical slots 64, 66 cooperate to provide locking means for preventing up and down movement of the headrest 14 relative to the seat shell 18. The locking means also permits back and forth movement of the headrest 14 relative to the seat shell 18 in a direction generally perpendicular to the back support portion 24 of the seat shell 18.

As shown in Fig. 4, shroud 94 of each actuator 54, 56 is substantially oval in shape and includes an oval end wall 146 defining inner surface 144 and a side wall or outer rim 148 coupled to end wall 146. End wall 146 and side wall 148 cooperate to define a cavity 150 formed to receive a portion of respective engagement bracket 92, as shown in Figs. 5 and 6, for example. A first aperture 152 is formed through end wall 146 and a second aperture 154, spaced-apart from first aperture 152 is also formed through end wall 146. Second aperture 154 is larger than first aperture 152 and is formed to receive the second, wider portion 134 of locking pin 20 therethrough, as shown in Figs. 5 and 6. First aperture 152 is formed to receive the guide pin 112 therethrough. End wall 146 of shroud 94 is positioned adjacent to and engaged with respective flange members 68, 70 of back support portion 24.

As mentioned above, actuators 54, 56, and thus headrest 14, are movable between locked and unlocked positions. In the locked position, as shown in Figs. 5 and 8, headrest 14 is prevented from moving upwardly and downwardly relative to seat shell 18, whereas in the unlocked position, as shown in Figs. 6, 7, 9, and 10, headrest 14 is permitted to move upwardly and downwardly relative to seat

shell 18. As shown in Figs. 5 and 8, second, wider portion 134 of locking pin 20 is received within one of the three position indicators 22 of the respective vertical slot 66 when the actuator 56 is in the locked position.

Diameter 136 of wider portion 134 is greater than a width 156 of the vertical segments 82, 84, 86 (shown in Fig. 4) of each vertical slot 64, 66 to prevent locking pin 20 (and thus actuators 54, 56 and headrest 14) from being able to move upwardly or downwardly when wider portion 134 locking pin is received within one of the position indicators 22. Further, a width 157 of each position indicator 22 is greater than the width 156 of the vertical segments 82, 84, 86, but is large enough to receive second portion 134 of locking pin 20 therethrough. Guide pin 112, having a smaller diameter 138 than that of second portion 134 of locking pin 20, is received within one of the vertical segments 82, 84, 86 of respective vertical slots 64, 66 positioned adjacent to and below the particular position indicator 22 within which second portion 134 of locking pin 20 is positioned when engagement bracket 92 is in the locked position.

Looking now to Figs. 6-8, a first method or means for moving headrest 14 and actuators 54, 56 to the unlocked position and adjusting the height of headrest 14 above bottom seat portion 16 is provided. This first method allows a user to adjust the height of headrest 14 from the front of seat 10. As shown in Fig. 6, a user grabs headrest 14 and pulls headrest 14 in a direction away from back support portion 24. Illustratively, the user is shown to grab the wing member 46 of headrest 14; however, it is within the scope of this disclosure for the user to grab any portion of headrest 14 when moving headrest 14 away from back support portion 24 toward the unlocked position. As shown in Figs. 6-8, the headrest 14, locking pin 20, and guide pin 112 move horizontally in a direction generally perpendicular to a plane formed through the back support portion 24 when moving between the locked and unlocked positions. As shown in Fig. 6, therefore, back plate 42 of headrest 14 is spaced-apart from back support surface 48 of back support portion 24 in the unlocked position and is engaged with back support surface 48 in the locked position.

As headrest 14 is moved away from back support portion 24, back plate 110 of engagement bracket 92 of each actuator 54, 56 is moved against the bias of each respective spring 96 to move locking pin 20 and guide pin 112 with headrest

14 such that second, wider portion 134 of locking pin 20 is removed from within lowest position indicator 76 and first, narrower portion 130 of locking pin 20 is received within position indicator 76. Diameter 132 of first, narrower portion 130 of locking pin 20 is slightly smaller than width 156 of vertical segments 82, 84, 86 of vertical slots 64, 66. As mentioned above, the diameter 138 of the guide pin 112 is also slightly smaller than width 156 of vertical segments 82, 84, 86. Therefore, in the unlocked position, headrest 14 with actuators 54, 56 is movable upwardly and downwardly relative to seat shell 18. As headrest 14 is moved upwardly, as shown in Fig. 7, for example, guide pin 112 and first, narrower portion 130 of locking pin 20 slide within vertical segments 82, 84, 86 and position indicators 22 of vertical slots 64, 66.

Once the headrest 14 has been moved to the desired height above bottom seat portion 16, the user or caregiver releases headrest 14, as shown in Fig. 8, and the spring 96 of each actuator 54, 56 acts to bias engagement brackets 92 to the locked position. Headrest 14, which is coupled to engagement brackets 92, is therefore biased in a direction toward back support portion 24 such that second portion 134 of locking pin 20 is received within a position indicator 22. Thus, headrest 14 and actuators 54, 56 are in the locked position and headrest is prevented from moving up or down relative to seat shell 18.

A second method or means of moving actuators 54, 56 to the unlocked position in order to raise or lower headrest 14 above bottom seat portion 16 of seat shell 18 is shown in Figs. 9 and 10. This second method allows the user or caregiver to adjust the height of the headrest 14 from the rear side of the seat 10. As shown in Fig. 9, the user may depress engagement brackets 92 of each actuator 54, 56 against the bias of each spring 96 by pushing against outer or rear surface 116 of base 110 of each respective engagement bracket 92. As shown in Figs. 9 and 10, the action of pushing against the engagement brackets 92 from the rear of the seat 10 moves headrest 14 in a direction away from back support portion 24 and disengages second, wider portion 134 of locking pin 20 from within one of the position indicators 22 of respective vertical slots 64, 66. Once in the unlocked position, the first, narrower portion 130 of locking pin 20 and guide pin 112 are able to move upwardly and

downwardly within respective vertical slots 64, 66 to adjust the height of headrest 14 above bottom seat portion 16.